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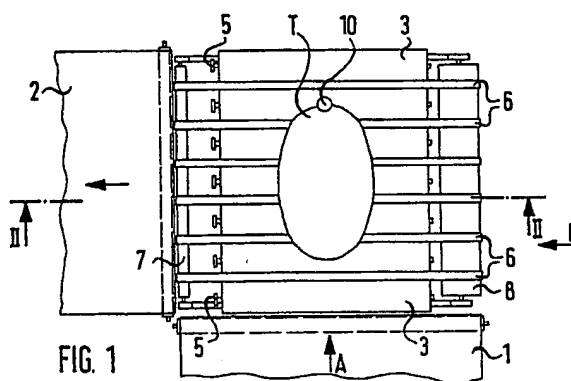
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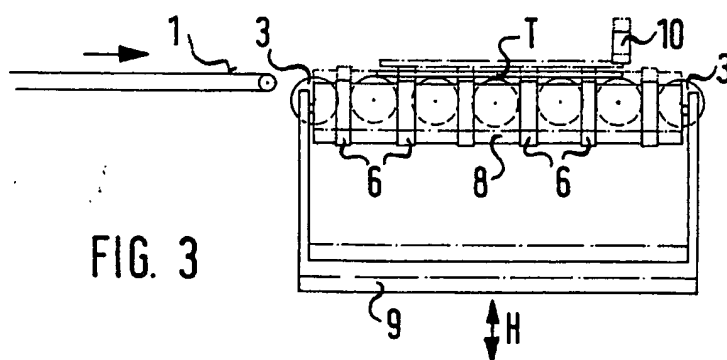
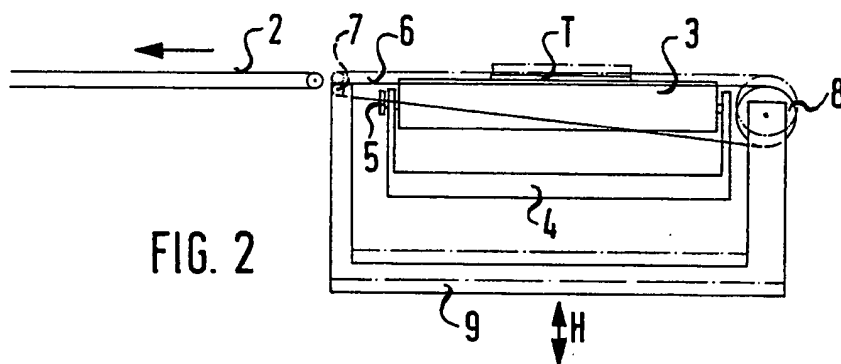
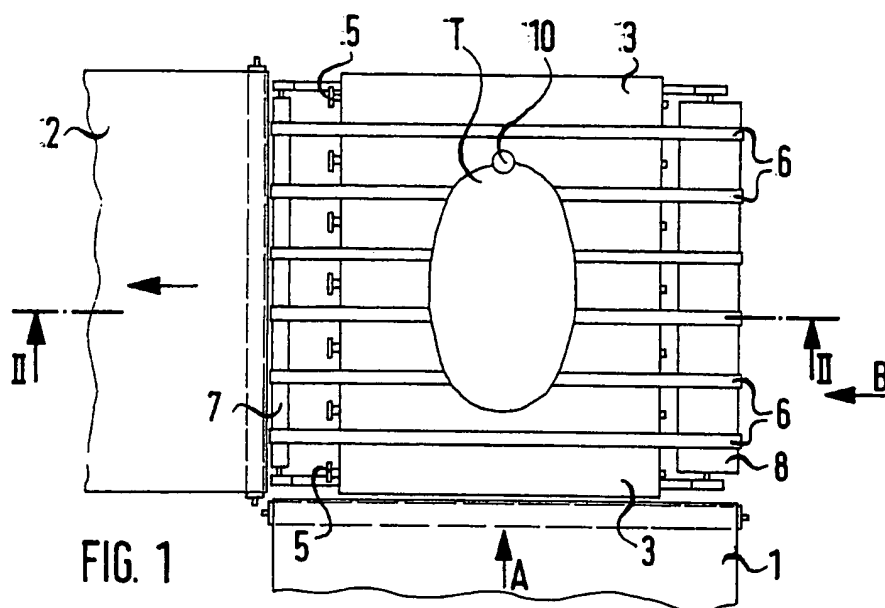
(58) Field of search
B8A
Selected US specifications from IPC sub-class B65G

(54) Conveying apparatus

(57) Conveying apparatus serves for the conveying of flat dough pieces (T) and effects transfer of the dough pieces from a first conveying path (1) to a second conveying path (2) extending at a right angle thereto. A group of conveying rollers (3) one following the other in conveying direction (A) is provided in the first path (1) and a group of parallel conveyor belts (6) running in conveying direction (B) is provided in the second path (2). The conveyor rollers (3) are arranged in alternation with and beside the conveyor belts (6) at a junction of the two paths (1, 2) and the group of the conveyor rollers (3) and the group of the conveyor belts (6) are movable up and down relative to each other.



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SPECIFICATION

Conveying apparatus

5 The present invention relates to conveying apparatus, especially apparatus for conveying flat dough pieces.

During the mechanical manufacture of Arabic round flat loaves (pitta), flat dough pieces to be
10 baked are produced in such a manner that severed and rounded dough portions are rolled flat by two rolling mechanisms arranged at right angles to each other. During passage through a first one of the rolling mechanisms the dough piece receives
15 an elongate oval shape which, during rolling transversely thereto in the second rolling mechanism, is converted into the desired circular shape. For the purpose of these operations it is necessary to transfer the pieces of dough from a conveyor path
20 with the first rolling mechanism to a second conveyor path which extends at a right angle to the first path and in which the second rolling mechanism is disposed. This transfer, during which the shape of the dough pieces should not be changed,
25 entails problems because of the relatively soft nature of the dough.

One basically suitable form of angle transfer device is disclosed in German (Federal Republic) patent specification No. 27 52 464, wherein the end of
30 the first conveyor path, usually formed by a conveyor belt, extends obliquely upwards, from where the pieces of dough turn over in a free fall onto the second conveyor path also formed by a conveyor belt. In the case of dough pieces with diameters
35 greater than about 250 millimetres and above all in the case of very thin dough pieces, difficulties appear because a very high conveying speed is required for complete turning over. The high conveying speed in turn requires a high circumferential speed of the rollers of the first rolling mechanism, which leads to impairment of the surface of
40 the dough pieces.

Another kind of the angle transfer device for flat dough pieces by means of a reciprocable deposit
45 belt tongue is disclosed in German (Federal Republic) patent specification No. 723 271, but is not suitable for the manufacture of Arabic round flat loaves because the second conveyor path must be virtually still during the deposit operation. The intermittent conveying resulting therefrom is not acceptable due to the second rolling operation taking
50 place in the train of the second conveyor path.

In a baking oven described in German (Federal Republic) patent specification No. 1 030 791, raisable and lowerable conveyor chains are provided
55 between the rollers of a main conveyor leading away from the baking oven and form a transverse conveyor by which the articles to be baked, which are disposed in containers, are conveyed away laterally from the main conveyor. However, a chain
60 conveyor cannot be used for material as delicate as unbaked round flat dough pieces.

There is thus a need for conveying apparatus in which conveyed items, including flat dough cakes
65 of large diameter and small thickness, can be

transferred in careful manner between two conveying paths.

According to the present invention there is provided conveying apparatus comprising means defining two conveying paths extending at right
70 angles to each other and transfer means disposed at a junction of the paths for transfer of conveyed items from one path to the other and comprising a plurality of conveying rollers arranged one after
75 the other to form a length portion of one of the paths and a plurality of conveying belts arranged parallel to each other and in alternation with and beside the rollers to form a length portion of the other path, the plurality of rollers and the plurality
80 of belts being upwardly and downwardly movable relative to each other to effect transfer of conveyed items therebetween.

In the case of apparatus embodying the present invention, jerky handling of dough pieces can be
85 avoided, so that their shape and position on the conveyor paths is maintained even during the transfer. Since the transfer takes place quite independently of the speeds of the conveyor paths, these speeds can be matched in optimum manner
90 to the requirements of any upstream or downstream treatment stations for the dough pieces, for example rolling mechanisms.

Preferably the apparatus comprises sensing means to sense such conveyed items and control
95 said relative movement in dependence thereon. By this measure, account can be taken of non-uniform succession of the pieces of dough on the first conveyor path and a uniform positioning of the dough pieces on the second conveyor path can be
100 achieved.

An embodiment of the present invention will now be more particularly described by way of example with reference to the accompanying drawings, in which:

105 *Figure 1* is a plan view of part of apparatus embodying the invention, in the region of the junction of two conveyor paths of the apparatus;

Figure 2 is a cross-section along the line II-II in *Figure 1*; and

110 *Figure 3* is an elevation of the apparatus in the direction of arrow B in *Figure 1*.

Referring now to the drawings, there is shown conveying apparatus in which a first conveying path is defined by a feed conveyor belt 1 and is arranged at right angles to a second conveying path defined by a removal conveyor belt 2. Provided at a junction of the two paths in continuation of the belt 1 is a succession of conveyor rollers 3, which are mounted in a locally fixed frame 4 only schematically shown in *Figure 2* and have the same conveying direction and speed as the belt 1. This conveying direction is indicated by an arrow A. The drive of the conveyor rollers 3 is effected continuously by a chain drive (not shown) which, for
125 example, acts on chain wheels 5 mounted at the ends of the rollers 3.

Provided directly in front of the removal conveyor belt 2 in the conveying direction, denoted by an arrow B, of the second conveying path is a group of parallel conveyor belts 6 which are
130

guided over deflecting rollers 7 and 8. The conveyor belts 6 move in the same direction and at the same speed as the belt 2 and are driven by a motor (not shown) which acts on the deflecting roller 8. The belts 6 are mounted by the deflecting rollers 7 and 8 on a lifting frame 9, which is movable vertically up and down and the movement of which, emanating from a lifting device (not shown) is indicated by a double arrow H. A pneumatic or hydraulic piston-cylinder unit or a mechanical crank or cam drive can be provided as the lifting device.

As is evident from, in particular, Figure 1, the belts 6 are guided in such a manner by the deflecting rollers 7 and 8 that the conveyor rollers 3 are arranged in alternation with the conveyor belts 6 so that each roller is disposed alongside a respective one of the belts. The conveyor belts 6 have such a small width that their upper sides in the lower position, illustrated by solid lines in Figures 2 and 3, of the frame 9 lie underneath a horizontal plane tangential to the rollers 3. In the upper position, illustrated by chain-dotted lines, of the frame 9 the upper sides of the belts 6 are disposed above the mentioned horizontal plane and lie at the same height as the upper side of the belt 2.

In use of the apparatus, a dough piece T, which has been rolled flat by a rolling mechanism (not shown) in the train of the first conveying path and has the oval shape evident from Figure 1, passes from the feed belt 1 on to the group of conveyor rollers 3, at which time the lifting frame 9 with the conveyor belts 6 is disposed in the lower position. The dough piece T is conveyed forward on the rollers 6 in direction of the arrow A until it is disposed in the effective range of a sensor 10 arranged above the rollers 6 and preferably in the form of a capacitive proximity switch. This sensor delivers a signal pulse to the lifting device which then brings the lifting frame 9 into the upper position, during which the dough piece T is lifted off the rollers 3 by the belts 6 and now moved on these belts in direction of the arrow B to the belt 2. The dough piece T is then moved by the belt 2 to a further rolling mechanism (not shown) on which it is rolled once again at a right angle to the first rolling direction and in that case brought into a circularly round shape. After the transfer of the dough piece T onto the belt 2, the lifting frame is automatically brought back into the lower position, in which the device stands ready for the next transfer operation.

The same effect as described above can be achieved if, conversely to the illustrated embodiment, the conveyor belts 6 are arranged in locally fixed positions and the conveyor rollers 3 are movable up and down. The effect is also the same if the belts 6 are associated with the feed belt 1 and the rollers 3 with the removal belt 2.

60 CLAIMS

1. Conveying apparatus comprising means defining two conveying paths extending at right angles to each other and transfer means disposed at a junction of the paths for transfer of conveyed

items from one path to the other and comprising a plurality of conveying rollers arranged one after the other to form a length portion of one of the paths and a plurality of conveying belts arranged parallel to each other and in alternation with and beside the rollers to form a length portion of the other path, the plurality of rollers and the plurality of belts being upwardly and downwardly movable relative to each other to effect transfer of conveyed items therebetween.

2. Conveying apparatus as claimed in claim 1, comprising sensing means to sense such conveyed items and control said relative movement in dependence thereon.

3. Conveying apparatus as claimed in either claim 1 or claim 2, wherein the conveying paths and transfer means are adapted to convey unbaked flat dough pieces.

4. Conveying apparatus substantially as hereinbefore described with reference to the accompanying drawings.

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